

*brevidens* (Fig. 2.) may now be added to the faunal list. The closest relationships of the Chalk Cliffs local fauna would seem to lie with the Mascall fauna, indicating an early Barstovian age, but latest Hemingfordian age is not impossible. The stage of evolution of *Mytagaulus douglassi* is as might be expected in either a late Hemingfordian or early Barstovian mytagaulid, with a small weight of probability in favor of the latter age. Thus far, *Parahippus brevidens* has been known only from the early Barstovian Mascall fauna.

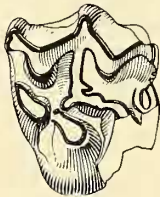


FIG. 2.—*Parahippus* cf. *P. brevidens*: Occlusal view of P<sup>3</sup> or P<sup>4</sup>. × 1.

Measurements (in millimeters).— As follows:

Length, P <sup>4</sup> -M <sup>3</sup> , inclusive . . . . .	17.4
Length, P <sup>1</sup> . . . . .	8.8
Length, diastema from incisor to P <sup>3</sup> . . . . .	24.4
Length, at midline, occiput to nasofrontal contact . . . . .	43.6
Width, P <sup>4</sup> . . . . .	6.8
Height, maxilla at P <sup>4</sup> to nasofrontal contact . . . . .	31.1

BOTANY.—*Studies in the Begoniaceae, IV.*<sup>1</sup> LYMAN B. SMITH, U. S. National Museum, and BERNICE G. SCHUBERT, U. S. Department of Agriculture.

This number of our series is an addendum to floristic treatments of the family for Peru,<sup>2</sup> Argentina,<sup>3</sup> and Colombia,<sup>4</sup> and a preface to further floristic papers.

#### VENEZUELA

*Begonia steyermarkii* Smith & Schubert, sp. nov.  
FIGS. 1, a-h

Herba annua fugitiva; foliis oblique rhombicis, apicem versus serratis; inflorescentiis bifloris; bracteis persistentibus, laceratis; tepalis masculinis 2, integris; filamentis in columnam connatis, antheris elongatis; bracteis femineis 2, per-

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sistentibus, accrescentibus, una bilobata; tepalis femineis 4, basi connatis; placentis simplicibus, stylis 3, bifidis, stigmatibus spiraleriter cinctis; alis capsulae inaequalibus.

Herbaceous annual 6-10 cm high; stem simple, hirtellous, ascending; leaves asymmetric, obliquely rhombic, acute at apex and more or less so at base, subpalmately veined, rather coarsely serrate on the upper margins and ciliate on the lower, up to 15 mm long and 8 mm wide, with erect multicellular scattered trichomes above, essentially glabrous below, petioles 1-3 mm long with a few scattered spreading trichomes, stipules persistent, lanceolate, acuminate, ciliate, 4-5 mm long, 1-1.5 mm wide; peduncles axillary 8-10 mm long, sparsely hirtellous; inflorescences 2-flowered, bracts persistent, lanceolate, lacerate, 1.5-2 mm long; staminate pedicels slender 2.5-3 mm long; staminate tepals 2, subelliptic, 5 mm long, 3.5 mm wide; stamens about 15, filaments connate in a column, anthers elongate, the connective slightly

<sup>1</sup> The previous number in this series was this JOURNAL **40**(8): 241-245. 1950.

<sup>2</sup> *Begoniaceae*. In Macbride, Flora of Peru. Field Mus. Nat. Hist. Bot. **13**: no. 1: 181-202. 1941.

<sup>3</sup> *Revisión de las especies Argentinas del género Begonia*. Darwiniana **5**: 78-117, figs. 1-18. 1941.

<sup>4</sup> *The Begoniaceae of Colombia*. Caldasia **4**: 3-38, 77-107, 179-209, pls. 1-18. 1946.



FIG. 1.—*a*, *Begonia steyermarkii*, plant  $\times 1$ ; *b*, staminate flower  $\times 2$ ; *c*, androecium  $\times 5$ ; *d*, pistillate perianth and styles  $\times 2$ ; *e*, style  $\times 5$ ; *f*, larger pistillate bracteole  $\times 1$ ; *g*, capsule (bracteoles removed)  $\times 1$ ; *h*, seed  $\times 10$ . *i*, *Begonia bifurcata*, plant  $\times \frac{1}{4}$ ; *j*, stipule  $\times 5$ ; *k*, staminate flower  $\times 1$ ; *l*, pistillate flower  $\times 1$ ; *m*, capsule  $\times 1$ ; *n*, style  $\times 5$ . *o*, *Begonia brevicordata*, inflorescences and upper leaves  $\times 1$ ; *p*, staminate flower  $\times 1$ ; *q*, stamen  $\times 5$ ; *r*, style  $\times 5$ . *s*, *Begonia sleumeri*, staminate plant  $\times 1$ ; *t*, pistillate plant  $\times 1$ ; *u*, androecium  $\times 5$ ; *v*, style  $\times 5$ .

produced; pistillate bracteoles 2, persistent, acrescent, serrulate-ciliolate, the smaller ovate, 8 mm long, 5 mm wide, the larger bilobed with the halves slightly asymmetrical, 6-7 mm long and each 4-5 mm wide; pistillate pedicels 6-7 mm long; pistillate tepals 4, fused at base, each lobe ca. 2.5 mm long and 1.5 mm wide; styles 2-parted with the stigmatic tissue in a more or less spiral band; ovary 3-celled, placentae simple, ovuliferous throughout, capsule subelliptic, glabrous, 6 mm high, 2 wings subequal about 6 mm long, 2 mm wide, the third wing larger, 7 mm long, 6 mm wide, all more or less rounded; seeds oblong, obtuse, about 1 mm long, stalked, alveolate, the basal alveolae longer than wide.

Type in the U. S. National Herbarium, no. 2144327, cultivated at the U. S. Plant Introduction Garden, Glenn Dale, Md. (PI 211848), from seeds sent from the Missouri Botanical Garden, J. A. Steyermark (no. 75502).

Additional specimens examined: Bolivar: On dry ledges, Chimantá Massif, along base of south-east-facing sandstone bluffs of Chimantá-tepuí (Torono-tepuí), from south corner northeastward, altitude 1,700 meters, May 21, 1953, *J. A. Steyermark* 75502 (F, US). Around dry talus with dry leaves at base of bluff, between Bluff Camp and low promontory north of Bluff Camp, along west-facing portion of Chimantá-tepuí (Torono-tepuí), altitude 1,600-1,700 m, June 5, 1953, *J. A. Steyermark* 75639 (F, US).

Since the original collection of Dr. Steyermark, no. 75502, has very mature fruit but neither leaves nor flowers, and his no. 75639 has flowers but no mature fruit, we have chosen as type the more complete plants from a cultivated collection as cited above.

The species is easy to propagate, but the life of each small plant is not very long, and it is to be cultivated more for its botanical interest than its ornamental value. We are grateful to Dr. John L. Creech, superintendent of the U. S. Plant Introduction Garden at Glenn Dale, Md., for making available the cultivated material for herbarium specimens as well as additional collections of flowers in preservative for study and dissection. We also appreciate the interest of Dr. Fred G. Meyer of the Missouri Botanical Garden in sending us seeds and specimens of this interesting species.

The affinities of *Begonia steyermarkii* are clearly in the section *Poecilia* A. DC. It may be distinguished from the other South American species

of the section by its relatively long stamencolumn with elongate anthers, by its bracteoles, one of which is 2-lobed and surrounds 2 capsule-walls, and by its gamotepalous 4-lobed pistillate perianth. This last character is an especially interesting one since it is the character which has been used to distinguish three small segregates from *Begonia*. The appearance of gamotepaly in this connection leads us to believe that at least among the American Begoniaceae it is of less significance than the characters used to distinguish sections, apparently having evolved at several different points in the development of *Begonia*.

#### COLOMBIA AND ECUADOR

*Begonia* L. Sp. Pl. 1056. 1753.

*Begoniella* Oliver, Trans. Linn. Soc. 28: 513. 1873; emended by Oliver in Hook. Ic. 14: 38. 1881; emended by Smith & Schubert, *Caldasia* 4: 204. 1946.

*Semibegoniella* C. DC. Bull. Herb. Boiss. II. 8: 327. 1908.

As noted above (under *Begonia steyermarkii*), it is our feeling that the characters upon which *Begoniella* and *Semibegoniella* were based are no longer tenable. In our treatment of the Begoniaceae of Colombia (p. 205), we stated that the transition from *Begonia* to *Begoniella* "is obviously through *Begonia* § *Casparya* and specifically through *B. killipiana* which rather strikingly resembles *Begoniella whitei*." In addition, *Begonia killipiana* has biseriate stamens as in *Begoniella whitei* and *libera* and *Begonia hexandra* Irmscher. Since this character of biseriate stamens occurs in both genera it lends no support of correlation with the character of gamotepaly. There is even less support for *Semibegoniella* as only the staminate tepals are connate there. Consequently we have transferred the species to the section *Casparya* of *Begonia* as follows:

*Begonia grewiiifolia* (A. DC.) Warb. in Engler & Prantl, Pflanzenfam. 3: Abt. 6a: 146. 1894.  
*Casparya grewiiifolia* A. DC. Ann. Sci. Nat. IV. 11: 117. 1859.

*Semibegoniella jamesoniana* C. DC. Bull. Herb. Boiss. II. 8: 327. 1908.

*Semibegoniella sodiroi* C. DC. l. c.

*Begonia irmscheri* Smith & Schubert, nom. nov.  
*Begoniella angustifolia* Oliver in Hook. Ic. 15: 68, pl. 1487. 1885; Smith & Schubert, *Caldasia* 4: 208, pl. 18. 1946, non *Begonia angustifolia* Blume, 1827-28.



*Begonia kalbreyeri* (Oliver) Smith & Schubert, comb. nov.

*Begoniella kalbreyeri* Oliver in Hook. Ic. **14**: 38, pl. 1352. 1881; Smith & Schubert, *Caldasia* **4**: 208, pl. 18. 1946.

*Begonia kalbreyeri* var. *glabra* (Smith & Schubert) Smith & Schubert, comb. nov.

*Begoniella kalbreyeri* var. *glabra* Smith & Schubert, *Journ. Washington Acad. Sci.* **40**: 244. 1950.

*Begonia lehmannii* (Irmscher) Smith & Schubert, comb. nov.

*Begoniella lehmannii* Irmscher, *Bot. Jahrb.* **74**: 630. 1949.

*Begonia libera* (Smith & Schubert) Smith & Schubert, comb. nov.

*Begoniella libera* Smith & Schubert, *Caldasia* **4**: 206, pl. 18. 1946.

*Begonia oliveri* Smith & Schubert, nom. nov.

*Begoniella whitei* Oliver, *Trans. Linn. Soc.* **28**: 513, pl. 41. 1873; Smith & Schubert, *Caldasia* **4**: 205, pl. 18. 1946, non *Begonia whytei* Stapf. 1905.

#### PERU

*Begonia bifurcata* Smith & Schubert, sp. nov.

Figs. 1, *i-n*

Perennis, tuberosa; caule quam petiolis pedunculisque multo brevior; foliis paucis, late ellipticis, valde asymmetricis, stipulis deciduis, pedunculis elongatis; inflorescentia pauciflora, bifurcata; tepalis exterioribus glanduloso-hispidis; tepalis masculinis 4; filamentis in columnam angustam connatis; tepalis femineis 5; placentis bilamellatis; stylis 3, bifidis, ramis linearibus, stigmatibus spiraliter cinctis; capsula hispida alis valde inaequalibus.

Perennial from a tuberous base, 28 cm high, sparsely hispid; stem erect, slender, 5 cm long; leaves oblique or transverse, broadly elliptic, acute, sometimes with a small secondary lobe, deeply and narrowly cordate at base, to 13 cm long and 9 cm wide, palmately 8-nerved, denticulate, thin, petioles slender, to 14 cm long, pilose, stipules deciduous, broadly ovate, acute, 5 mm long, dentate, membranaceous; peduncles to 17 cm long; inflorescence 2-branched, few-flowered; bracts persistent ovate, subentire, setose-ciliate; fruiting pedicels 25 mm long; tepals pale rose, the outer bearing stiff hairs with dark swollen bases; staminate tepals 4, elliptic, obtuse, subequal, 6 mm long, entire; stamens borne on a slender column 1.5 mm long, anthers elliptic-oblong, 1 mm long, about equaling the filaments, connective not produced; pistillate tepals 5; ovary 3-celled, placentae bilamellate, styles bifid, stigmatic tissue linear, spiral; capsule more or

less decurved, subglobose, wings very unequal, the largest triangular-ovate, ascending, 5 mm wide, the others narrowly marginiform.

Type in the U. S. National Herbarium, no. 2057660, collected in forest, above Canchaque, Province of Huancabamba, Department of Piura, Peru, altitude 1,500–1,600 meters, March 22, 1948, by Ramón Ferreyra (no. 3103).

This species would fall next to *B. monadelpha* (Kl.) R. & P. in our key to Peruvian *Begonia* because of its stamen-column but is otherwise completely unlike it. Except for the stamen-column it would more appropriately go next to *B. veitchii* Hook. f. from which it differs in its long petioles, transverse leaf-blades, and narrow anthers. We feel that as might be expected from its native locality it is more nearly related to the Ecuadorian *B. parcifolia* C. DC. than to any Peruvian species, but unlike that it has the outer tepals and capsule glandular-hispid.

The habit has been drawn with breaks between the parts to indicate reconstruction from fragmentary material.

*Begonia brevicordata* Smith & Schubert, sp. nov.

Figs. 1, *o-r*

Glabra; foliis obliquis, late ellipticis vel ovatis, basi abrupte breviterque cordatis, stipulis deciduis; inflorescentia laxa pauciflora; bracteis deciduis; tepalis albis, masculinis 2, ovatis, obtusis; staminibus liberis; tepalis femineis 5; placentis bilamellatis; stylis 3, bifidis, basi connatis; alis capsulae inaequalibus.

Plant 40 cm high, glabrous; stems slender; leaves oblique, broadly elliptic or ovate, abruptly acute, abruptly and shallowly cordate at base, 4–5 cm long, denticulate, finely alveolate when dry, petioles 15–50 mm long, stipules deciduous, elliptic, subulate-acuminate, 11 mm long, entire; peduncles 3–8 cm long, slender; inflorescence laxly few-flowered; bracts deciduous, the basal ones like the stipules, the others much smaller; pedicels 10–12 mm long; tepals thin, white, the staminate 2, ovate, obtuse, 6–10 mm long, entire, minutely red-glandular on the margin; stamens free, numerous, anthers linear, longer than the filaments, connective not produced; pistillate flowers bracteolate; pistillate tepals 5, the outer red-glandular at apex; ovary 3-celled, placentae bilamellate, styles bifid, connate at base, stigmatic tissue linear, spiral; capsule erect, obovoid, wings unequal, ovate, obtuse.

Type in the U. S. National Museum, no.

1952111, collected on the edge of woods, Santa Isabel, Valley of Kosñipata, Department of Cuzco, Peru, altitude 1,320 meters, December 1947, by C. Vargas C. (no. 6767). Duplicate in the Gray Herbarium.

Additional specimen examined: Cuzco: Santa Isabel, Valley of Kosñipata, alt. 1,200 m, July 23-31, 1948, *R. Scolnik* 927 (US).

Probably the nearest relative of *Begonia brevicordata* is *B. lophoptera* Rolfe, but the latter species unlike ours is pilose and has lobed leaves and thick fleshy papillose-hirsute tepals.

*Begonia erythrocarpa* A. DC. in Ann. Sci. Nat. IV. 11: 121. 1859.

*Begonia pennellii* Smith & Schubert in Macbride, Fl. Peru, Field Mus. Publ. Bot. 13<sup>3</sup>: 196. 1941.

#### BOLIVIA

*Begonia williamsii* Rusby & Nash, *Torreya* 6: 47. 1906.

*Begonia acrensis* Irmscher, Bot. Jahrb. 74: 605. 1949.

#### BRAZIL

*Begonia curtii* Smith & Schubert, nom. nov.

*Begonia velata* Brade, Arq. Jard. Bot. Rio de Janeiro 10: 133, pl. 2. 1950, non Smith & Schubert, Field Mus. Publ. Bot. 13<sup>3</sup>: 201. 1941.

We take particular pleasure in this opportunity to commemorate the outstanding work of Dr. Alexandre Curt Brade in Brazilian Begonia.

*Begonia egregia* N. E. Br. Gard. Chron. III, 1: 346. 1887.

*Begonia quadrilocularis* Brade, *Rodriguesia* 9: 21, pl. 6. 1945.

#### ARGENTINA

*Begonia sleumeri* Smith & Schubert, sp. nov.

FIGS. 1, s-v

Perennis, tuberosa, pilis articulatis vestita; foliis longipetiolatis, suborbicularibus; inflorescentia uniflora; tepalis masculinis 5-6; staminibus in columnam convexam insertis, antheris ellipticis; tepalis femineis 7; stylis bifidis.

Perennial from a small tuberous base, 6-8 cm high, very sparsely pubescent with pale multicellular trichomes; stem erect, not more than 1 cm long; a single leaf with each scape, blade suborbicular and without a distinct apex, cordate, 12-30 mm in diameter, crenate-dentate, petioles to 45 mm long, red, stipules persistent, suborbicular, 3-5 mm long, erose, ciliate, membranaceous, red; peduncle erect, 2-6 cm long, one-flowered; bracts resembling the stipules, pedicels 5-15 mm long; flowers ebracteolate, white; staminate tepals 5-6, elliptic, obtuse, equal, 10 mm long, entire, glabrous; stamens numerous on a convex column, filaments 2 mm long, anthers elliptic, 0.7 mm long, connective not produced; pistillate tepals 7, like the staminate; ovary 3-celled, placentae bifid (?), styles bifid; capsule subglobose, wings unequal, the largest triangular, acute.

Type in the U. S. National Herbarium, no. 2103588, collected on cumbre at Abra de Tiraxi, Department of Tumbaya, Province of Jujuy, Argentina, altitude 3,200 meters, December 31, 1952, by H. Sleumer (no. 3189).

In our treatment of Argentine Begonia, *B. sleumeri* would fall next to *B. tafiensis*. However, it is readily distinguishable from that species by its more numerous tepals, elliptic rather than obovate anthers, and much smaller capsule-wings. It has not been possible to verify the form of the placentae without ruining the single immature capsule available but presumably they are bilamellate.

MYCOLOGY.—A small *Conidiobolus* with globose and with elongated secondary conidia. CHARLES DRECHSLER, United States Department of Agriculture, Plant Industry Station, Beltsville, Md.

Most species of *Conidiobolus* that appear adventitiously in agar plate cultures prepared for the isolation of parasitic oomycetes from decaying roots, or that develop in agar plates canopied with small quantities of slowly decomposing plant detritus, would seem moderately coarse in comparison with microscopic fungi generally. In the main,

however, they do not share the large dimensions of the very robust *C. utriculosus* Brefeld (1884) on which the genus was founded and by which almost exclusively, it was known for more than half a century. Among my isolations of readily culturable entomophthoraceous fungi two species of *Conidiobolus* are more particularly characterized